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The Impacts of State Control Policies on College Tuition Increase

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Abstract

This study examined state efforts to control tuition increases over the past 10 years. Using data from 50 states and 540 public 4-year universities and colleges, we examined average tuition increases in dollar amount and percentage of change by the type of state tuition control policy and by the authority for tuition-setting power. The state policy efforts considered for this study include setting tuition caps, providing incentives, and linking tuition policy to financial aid policy. Findings revealed that two state policies (i.e., linking tuition to financial aid and providing incentives to limit the tuition increase) are effective in controlling tuition. Tuition was more likely to increase when individual institutions have tuition-setting authority. This study also reveals that a state's tuition cap policy can adversely affect tuition control.

Keywords

state tuition policies, public institutions, control-autonomy

Introduction

One of the most pressing educational policy issues is college tuition price or tuition policy. Tuition price increase has become a global topic or

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phenomenon for the past two decades (Organization for Economic Co-Operation and Development [OECD], 2012). Since 1995, many countries have started to restructure their tuition policies. The United Kingdom, for example, which used to charge no tuition or fees in public institutions, has begun charging them (Marcucci & Johnstone, 2007). College tuition price in the United States has also steadily increased for the past four decades, and since the late 1990s, tuition increases have accelerated beyond inflation and family incomes (College Board, 2012). As they accelerated over the years, tuition increases became a concern for students and families as well as for policy makers (Boehner & McKeon, 2003; Hearn, Griswold, & Marine, 1996). For instance, tuition and fees increased 103.8% (from $6,118 to $12,467 using the US dollar), while average household income increased only 39.3% (from $35,492 to $49,445) between 1996 and 2010 (College Board, 1999; U.S. Census Bureau, 2011). Between 1972 and 2013, average tuition for public 4-year institutions increased from $376 to $8,655 in current value (from $2,117 to $8,655 in constant value; College Board, 2012). Due to tighter state budgets and depressed economic conditions, this pattern of tuition increase does not seem likely to level off.

Along with public concerns about college affordability in the United States, federal government efforts to address affordability issues have materialized in a series of Acts including the College Access and Opportunity Act of 2003 and the College Cost Reduction and Access Act of 2007, which introduced the College Affordability Index (CAI), a standard affordability measure designed to empower students and parents by providing easily understandable information about college cost. In 2008, the Higher Education Opportunity Act (HEOA) was passed with a heavy emphasis on college affordability issues. As a result, the HEOA has established some control power over institutional tuition. For instance, the Act required the National Center for Education Statistics (NCES) to publish college affordability and transparency lists (e.g., showing the institutions with the highest 5% of tuition/fees, those with the lowest 10% of tuition/fees) by nine institutional categories (e.g., institutional control) and by length of program (HEOA, 2008).

While the federal government and Congress attempt to control high tuition through federal laws, states have introduced policies to reduce college cost and limit tuition and fee increases. This study focuses on the state tuition control policies to investigate whether state tuition control policies or efforts to minimize tuition increase (i.e., providing tuition caps, curbs, and/or freezes; offering incentives; and linking tuition policy to financial aid policy) work to control college tuition. If they had an impact on tuition, which policies would be working better and by which type of tuition-setting authority?

This study examined the effect of state tuition policy on tuition increases (dollar amount and rate), controlling for related institutional financial characteristics and competing tuition policies, to make sense of the effects of states' tuition control policies. Despite the significance of these state polices, only a few studies (e.g., Burgess, 2011; Cheslock & Hughes, 2011; Mumper, 2003) have examined the link between specific state tuition policies and college affordability and tuition changes in the public institutions.

Related Literature

Driving Factors of Tuition Increases

Because tuition setting is a complex and ambiguous process (Heller, 2001; The Institute for Higher Education Policy, 1999; Johnston, 2006; Mumper, 2001b), it is not necessarily clear what factors or entities most heavily influence the actual level of tuition across all states. Mumper (2001b) nevertheless identified three causes that were widely agreed upon: (a) reduced state appropriations; (b) increased institutional spending on services, facilities, and compensation; and (c) increased spending to provide remedial courses for unprepared students entering institutions. The reduction of state appropriations has been the most frequently recognized contributing factor over time, and became a consensus opinion among scholars in finance and economics (Hauptman, 1990; The Institute for Higher Education Policy, 1999; Kane, 1994; Koshal & Koshal, 2000; Mortenson, 2003; Mumper & Freeman, 2005; National Commission on the Cost of Higher Education [NCCHE], 1998; Okunade, 2004; Paulsen, 2001).

The causes of tuition increases vary by state and individual institutions. An attempt to systematically investigate the causes of tuition increase was set forth in Hauptman's (1990) *The College Tuition Spiral*. Hauptman provided five categories of explanations for the tuition increases in the 1980s: the increased prices that colleges are paying for the various goods and services they purchase; the use of expanded and improved services including capital needs; the declining share of costs covered by other non-tuition revenue sources such as state appropriations; the expansion of available student aid from federal, state, and institutional sources; and intensified competition for students and faculty (Hauptman, 1990).

During the late 1990s, the NCCHE (the Commission) examined tuition inflation by reviewing comprehensive quantitative data and interviewing a number of experts (the NCCHE, 1998). Although the Commission was unable to reach a clear conclusion regarding the causes of tuition inflation, some driving factors were identified. The NCCHE (1998) recognized that

reduced state appropriations and increasing technology costs were the major driving factors for tuition increases and that administrative costs and institutional financial or tuition aid as well as federal, state, and local governmental regulations could also be contributing to tuition increases. Changes in faculty composition and workload were not considered a major driving factor for tuition changes.

While tuition policy studies tend to focus on the cost-side factors, Paulsen (2001) looked at the demand-side causes of rising tuition, including the job-market opportunities or economic returns for college graduates relative to high school graduates, the increase in the number of potential college-bound students, and the perception among peer members of institutions that view themselves as good substitutes. Paulsen also noted the cost-side factors such as the decreasing revenue share of state government appropriation, administrative and student services expenditures per student, and increase in per-student expenditures on institutional aid.

After interviewing policy makers in 11 states, Mumper (2001a) described the factors behind tuition inflation, including reduced state appropriations and increased state spending in other areas such as Medicaid and prisons, higher quality academic programs, and unaccountable spending by higher education institutions. Other scholars in tuition policy (Callan & Finney, 2002; Ehrenberg, 2000) also addressed the forces acting to increase tuition, including institutional desire to be a better college or university, a governance system that responds slowly to cost pressures, certain federal government policies, and other external forces such as local government and budgetary organizations and the neighboring states' tuition levels.

Tuition-Setting Authority

Scholars in political science or public policy (e.g., Calhoun & Kamerschen, 2010; Hearn et al., 1996; Lowry, 2001) often examined the relationship between the governing structures and tuition price; most of them seemed to reach a conclusion that the governing structure matters. According to Calhoun and Kamerschen (2010), institutions maintained by a more centralized governing board structure tend to have lower average tuition, while institutions maintained by a more decentralized governing board tend to have higher tuition.

Tuition-setting authority can be categorized in three ways, depending on who has primary authority for establishing tuition. First, in some states the legislature or the state government's statewide coordinating/governing boards have the authority to determine the specific tuition policies and tuition levels; second, coordinating/governing boards for individual systems may have the

authority for setting and guiding tuition levels; and third, some states leave most tuition-setting authority to individual institutions (Bell, Carnahan, & L'Orange, 2011; Boatman & L'Orange, 2006; The Institute for Higher Education Policy, 1999; Rasmussen, 2003). More specifically, Bell et al. (2011) reported that the official tuition decision authority resides with the legislature or the state government's statewide coordinating/governing agency in 14 states (e.g., California), with the coordinating/governing boards for institutional systems in 19 states (e.g., Alaska and Georgia), and with the individual institutions in 10 states (e.g., Alabama and Virginia). In other states, multiple entities share the authority. However, even for organizations that share the same type of governing structure, tuition-setting authority, and procedures are inconsistent or varied among different states. For instance, because Wisconsin was categorized as a consolidated governing board type by Waller, Coble, Scharer, and Giamportone (2000), we expected the state's board to have centralized authority in tuition setting, but the Board of Regents for the individual systems in Wisconsin have the primary authority for establishing tuition and fees (Boatman & L'Orange, 2006).

Although institutions may have the final authority in setting their own tuition level, in many cases they do so within various state guidelines (very strict or moderate/limited guidelines). Still, some state governments have the authority to penalize institutions that raise the tuition too far beyond state guidelines. For instance, Florida and California reported that individual institutions set tuition rates (except for the regular system-wide student fees), but within very strict guidelines or parameters established by local or state-level entities (Boatman & L'Orange, 2006). Boatman and L'Orange (2006) found that institutions in five states (Delaware, Illinois, Michigan, Pennsylvania, and Wyoming) have full power to set their own tuition without external restrictions.

State Policies on Tuition Control

In responding to tuition increases, states have taken various actions to enhance college affordability (Mumper, 2001b). Mumper summarized state efforts at keeping public college affordable. State policy regarding tuition increases breaks down into four categories: (a) controlling institutional expenditures with mandated price controls, performance funding, and improved efficiency and productivity; (b) increasing institutional revenues by practicing a high-tuition/high-aid pricing model and raising non-resident tuition; (c) redesigning delivery systems, extending distance learning and virtual universities, and shifting to lower cost providers; and (d) increasing the resources of families and students through payment and savings bond programs.

Along with other efforts to reduce cost and maintain affordability, states have initiated various policies and practices *directly* focusing on tuition increases. According to Boatman and L'Orange (2006), 18 states have curbs, caps, or freezes on tuition to limit increases, 21 states provide incentives to minimize tuition increases, and 17 states link tuition policies to financial aid policies. In addition, many states have tried to reduce operation costs as a way of limiting increases in tuition rates (e.g., hiring freezes on new staff and/or not replacing staff who leave, delays on deferred maintenance and capital projects, elimination of programs, and salary freezes; Boatman & L'Orange, 2006). While numerous studies have investigated the factors related to tuition increase, including causes and consequences of tuition increases and the relationship between government structures and tuition level, few have directly targeted state policies on tuition at public higher education institutions. Thus, this study attempts to contribute to this under-studied tuition control topic.

Using curbs, caps, or freezes. An important practice is to directly intervene in tuition increase, using curbs, caps, or freezes. The state of Virginia demonstrates a good example of freezing and capping tuition. In the 1994-1996 biennium, Virginia first capped tuition and mandatory fee increases at 3% for in-state students and then implemented a "tuition freeze" policy for in-state education. Furthermore, Virginia rolled back in-state undergraduate tuition by 20% and made up the lost revenue from the general fund in FY2000 (State Council of Higher Education for Virginia, 2003). The Oklahoma State Regents for Higher Education also froze in-state tuition for the 2009-2010 academic year (Bell et al., 2011). The caps are mandated by state governing boards and have varied from 3% over the previous year to 6% and 10% (Boatman & L'Orange, 2006). One might reasonably expect that institutions adopting tuition caps, curbs, or freeze policies would not increase tuition as much as institutions practicing no tuition caps, curbs, or freeze policies. As Burgess's (2011) policy research suggests, the use of tuition caps could be a way to control tuition increase rates. No research, however, examined whether this expectation was met.

Linking tuition and financial aid. Linking tuition increase to student financial aid is a common practice to secure student access to college and limit tuition increase. According to Boatman and L'Orange (2006), some states attempt to use this practice and include the formalization of relationships between tuition level and financial aid: for example, low tuition/low aid (e.g., Idaho, Kansas), moderate tuition/moderate aid (e.g., Arizona), and high tuition/high aid (e.g., Pennsylvania, South Carolina). Linking tuition and aid was

particularly intended to ensure college access for talented low-income students and to enhance institutional student quality.

However, common practice or a state's more direct linkage policy requires institutions to provide a certain level of scholarship or financial aid, generally need-based financial aid, in accordance with tuition increases (see Boatman & L'Orange, 2006). As a result, minority students or low-income families, who are often sensitive to tuition increases, can receive more financial support to offset the increases. The percentage of revenue from tuition increases related to financial aid varies by state. Some states provide less than 5% of financial aid from total tuition increases (i.e., Alaska 1%, Ohio 3%, Washington 3.5%, and Louisiana 5%), while others provide higher percentages of financial aid from tuition increases (i.e., Arkansas 30%, California 25%, and Colorado 20%).

Using incentives. State governments provide various incentives to minimize tuition increases or to maintain affordability (Boatman & L'Orange, 2006). The incentives vary by state, from funding for statewide merit scholarships that consider tuition level (Florida and Georgia) to auditing institutions whose tuition increases are greater than specified in guidelines (e.g., 10% in New Jersey). Incentive is a key method that a state can design to prevent or resolve goal conflicts with an individual institution. That is, the state can provide rewards or punishments to the institutions on the basis of outcomes (e.g., funding for results in Missouri). Another common practice is to reduce state appropriations if tuition increases exceed specified amounts (e.g., Pennsylvania, Virginia). State incentives or penalties may indeed result in smaller tuition increases for universities in these states. No previous research, however, focused on the effects of state incentives on tuition control.

Conceptual Framework

For the analysis of research findings, we used the principal–agent model (also called agency theory) that originated from an economic perspective, but was applied to various areas such as accounting, finance, organizational behavior, and political science (Eisenhardt, 1989; Kivisto, 2005). To put it simply, the principal–agent model explains a relationship in which "one party (a principal) delegates works to another (an agent) who performs the work" (Eisenhardt, 1989, p. 58). The principal and agent usually have hierarchical relationships with information asymmetries; generally the agent has more information than the principal, and the principal and the agent are self-interested actors with divergent interests, meaning that they have goal conflicts. In the relationship between state government and individual institutions, state

governments are considered to be the principal (Lowry, 2001) because the governments have administrative and monetary power over individual higher education institutions. Public universities and colleges become agents because of their agency contract to accomplish the state's educational goals and to deliver educational outcomes at an affordable price using the taxpayers' public money (or through governmental appropriation).

In general, agent problems arise when (a) the principal and the agent have different or conflicting goals and (b) the principal lacks sufficient information about whether the agent works appropriately on the basis of the contract or agreement. Two frequently cited problem settings are adverse selection and moral hazard. The adverse selection is that the principal cannot select the best suitable agent because of limited information about the agent. As a result, the principal may select a non- or less-qualified agent. The moral hazard occurs when the agent pursues private goals that differ from those of the principal, using information asymmetries. Moral hazard refers to the lack of an agent's efforts toward the goals set by the principal (Eisenhardt, 1989). To prevent a moral hazard, the principal often develops monitoring mechanisms or outcome-driven contracts with the agent. The moral hazard setting and related concepts (e.g., contract, self-interest, risk transfer, risk averse) of the principal–agent model could help our understanding of the relationship between state government and individual higher education institutions, and provide a useful analytical conceptual lens through which to examine some important aspects of political control of states' higher education (Kivisto, 2005; McLendon, 2003). The major concepts of the principal–agent model can also help make better sense of the findings and problems revealed by this study.

Data and Method

This study not only initiates the investigation of the relationship between state tuition policies and tuition changes, but it can also stimulate public dialogues and much-needed follow-up studies on this research topic. This study was mainly guided by the following research questions:

Research Question 1: Do various state tuition control policies to minimize tuition increases (i.e., providing tuition caps, providing incentives, linking tuition policy to financial aid policy, and varying the authority for tuition-setting power) work to control college tuition?

Research Question 2: Which policies would be more effective, holding constant the initial tuition, enrollment change, and other selected tuition policies?

Data Description

We obtained the data from multiple sources. First, most institution-level data were obtained from the Integrated Postsecondary Education Data System (IPEDS) supported by the NCES. This study drew the following data from IPEDS: undergraduate student enrollment, percentage of out-of-state students, tuition and mandatory fees, percentage of tuition and mandatory fees in core revenue, and percentage of state and local government appropriation in core revenue. In the discussion of results, we use "tuition" to refer to the variable of tuition and mandatory fees combined. Second, for state policies on tuition setting and control, we adopted the survey data from State Higher Education Executive Officers (SHEEO). SHEEO has surveyed state tuition policy since 1988. Over the past 10 years, three surveys were conducted: 2003, 2006, and 2011 (Bell et al., 2011; Boatman & L'Orange, 2006; Rasmussen, 2003).

This study drew data from the 2003 and 2006 surveys because it aimed to investigate the impact of state policies on tuition increases between 1998 and 2007, when tuition increases became one of the most heated issues for the public, institutional administrators, and state and federal policy makers. Investigating the effects of tuition control during this period might provide some important insights. Because each survey asked questions about state policies on tuition and financial assistance covering the previous 3 years, responses to the surveys cover most of the selected time period. We decided not to use the latest SHEEO survey because only 40 states responded to the 2011 survey. We planned to select all 558 public 4-year universities and colleges in 50 states. However, after excluding special or professional institutions, our final data included 540 public colleges and universities.

Analysis Procedures

The credibility of this study is partially dependent on the quality of data and reports from SHEEO, because we used SHEEO survey items and reports for the source of each state's tuition control policies (tuition-setting authority, cap/curb/freeze policy, linking of tuition increase to financial aid policy, and provision of incentives/penalties). All state policy variables were created by drawing from and following SHEEO reports (Boatman & L'Orange, 2006; Rasmussen, 2003). For example, if states reported in either the 2003 or the 2006 survey that they had tuition caps, curbs, or freezes (a survey item consisting of all three efforts) on tuition increases, we coded the states as having a "cap policy" because two SHEEO reports mainly discussed state caps under the item "caps," minimally touching on curbs and freezes. Future SHEEO

survey and tuition policy studies should tease out these three types of efforts so that researchers will be able to determine the net effect of tuition cap policy over the other two efforts.

This study began with a univariate analysis to determine measures such as means and standard deviation. We then conducted bivariate analysis involving cross-tabulations, tuition and state appropriation change figures, and correlation. We calculated tuition increase in dollar amount and percentage changes between 1997-1998 and 2006-2007, and we examined average tuition increase by tuition-setting power and tuition policies. Finally, we conducted hierarchical multiple regression analysis to examine the state policy effects on tuition change. The base model and full model were created and compared. The base model was first built with 4 control variables including the initial base-year tuition amount and enrollment size change over 10 years. Then we added four authority and policy variables to the full model.

Variables

Dependent variables. The dependent variables are tuition (and mandatory fee) change in dollar amount and percentage between 1997-1998 and 2006-2007. (See Appendix A for the variable coding and descriptions.) Wording in this study alternates between "changes" and "increases" because we subtracted the tuition of 1997-1998 from that of 2006-2007, and tuition has never decreased during this period.

Independent variables. There were four control variables (basic institutional and financial characteristics): change in undergraduate student enrollment, tuition and fees in base year (1997-1998), percentage change of tuition and fees in core revenues, and percentage change of state/local appropriation in core revenues. We aimed to isolate the potential confounding factors in examining the effect of each state effort or policy on college tuition increase. Tuition and fees in the base year (1997-1998) were used as a control variable because the percentage of tuition increase or the actual tuition dollar changes would be different depending on each institution's past tuition level.

Changes in undergraduate student enrollment might be related to tuition increase (e.g., consumer response to price). Most studies agree that college price is an important factor for students, especially for low-income students, and it affects college participation and persistence in college (Mumper & Freeman, 2005; St. John, 1994; St. John, Paulsen, & Carter, 2005). Studies including those of Leslie and Brinkman (1987) and Heller (1997) have focused on the impact of price change on the college participation of different groups of students. The percentage change of tuition and fees in

core revenues and the percentage change of state/local appropriation in core revenues indicate the source of revenue and the financial structure of institutions.

In general, the legislature, the state governing or coordinating agency, individual system boards, or individual institutions have the authority to set tuition in public higher education institutions. A dichotomous variable was created: If individual institutions have the full authority to set tuition, then institutional authority = 1; otherwise, institutional authority = 0. We created this authority variable following Boatman and L'Orange's SHEEO report that institutions in only five states (listed in the literature section) have full power to set tuition. The state appropriation or its amount of change should be adjusted to isolate net effects of tuition policies in empirical research because the reduction of state appropriations has been the most frequently recognized contributing factor in the literature (e.g., The Institute for Higher Education Policy, 1999; Mumper & Freeman, 2005).

States' efforts on tuition control were coded on the basis of SHEEO reports. Cap/curb/freeze policy is based on one survey item: "Has there been a curb, cap, freeze, or other limit placed on tuition at any time in your state in the past three fiscal years?" (SHEEO Survey). Cap/curb/freeze policies could be understood as state efforts at imposing a limit on or barrier to tuition increases, because these caps are mostly mandated by state government or coordinating boards (Boatman & L'Orange, 2006). This study will refer to cap/curb/freeze policy as "cap policy."

Some states provide incentives to suppress tuition increases and/or require that tuition changes be directly linked to financial aid. Any state so identified by one of the two reports was considered to be a state having a policy on incentives or linking tuition and aid. See Appendices A and B for more detailed variable and data information.

Results

The average tuition and fee increase for all public institutions over a period of 10 years (between 1997-1998 and 2006-2007) was $2,758 (an 89.6% increase). Table 1 shows the means and standard deviations for the variables used in the study. The tuition percentage change ranges from 16.81% to 246.42%, and the tuition amount change ranges from $537 to $6,752 (not shown in Table 1). College enrollment at all public institutions also increased by about 3,110 on average. About 13% of colleges and universities have the authority to set tuition by themselves without much limitation by states. About 53% of institutions belong to states that provide incentives, and 40% of institutions belong to states linking tuition and financial aid.

Table 1. Means and Standard Deviations (Public Institutions; *N* = 540).

Variables	*M*	*SD*
Tuition change (1998-2007) ($)	2,758.06	1,233.34
Tuition change (1998-2007) (%)	89.58	32.87
Authority_Institution	0.13	0.336
Incentive	0.53	0.499
Link_Tuition & Aid	0.40	0.491
Caps_on_Tuition	0.57	0.495
Enrollment_Change	3,109.55	3,633.31
Tuition_Revenue % Change	0.46	15.28
State Appropriate_Revenue % Change	−3.15	11.31
Initial Tuition (1998)	3,189.79	1,200.38

Table 2. Tuition Increase, by Tuition-Setting Authority (Change From 1998-2007).

	Number	Tuition increases (dollar)	Tuition increases (percentage)
State/coordinating boards	182	2,349	100.2
Individual systems	288	2,668	82.4
Institutions	70	4,193	91.5
Total average	540	2,758	89.6

As a preliminary analysis, we generated the relationship between tuition increases and the trend of state appropriations over the past 20 years from the IPEDS (see Appendix C). Consistent with the previous report, tuition increases were sharper where state appropriation or support declined. In particular, tuition increases peaked when state appropriation decreased during the recessions in the early 1990s and 2000s.

State Policies and Tuition and Fee Increases

According to Table 2, institutions that have the power to set their tuition have a higher total tuition increase (about $4,193) than those institutions where legislatures/statewide agencies or individual systems' coordinating boards have primary authority for establishing tuition (about $2,349 and $2,668, respectively). It is reasonable to anticipate higher tuition increases for individual institutions that have their own authority to set tuition policy.

The actual tuition dollar increase is striking—close to double—when the institution has tuition-setting control, compared with increases where other

Table 3. Tuition Increase, by Selected Tuition Policies (Change from 1998-2007).

	Institutions (number)	Tuition increases (dollar)	Tuition increases (percentage)
Have caps	308	2,923	96.9
No caps	232	2,539	79.9
With incentives	288	2,655	83.7
No incentives	252	2,875	96.3
Linking financial aid policy	217	2,295	85.5
No linking financial aid policy	323	3,069	92.3

sources have authority (Table 2). The actual dollar increase was lowest where state boards have tuition-setting power. Ironically, however, the highest percentage of tuition increase occurred where state/coordinating boards had tuition-setting authority.

Notably, the percentage of tuition increase in the institutions under state/state agency control is higher than in those individual institutions having tuition-setting authority. This provides an additional reason for analyzing dollar and percentage regression models so as not to misrepresent the size and scale of tuition increases. Table 1 shows that tuition change as a percentage increase of core revenue is virtually stable, that is, only a 0.46% increase among public institutions overall. However, the contribution of state appropriations toward the core revenue dropped by 3.14%.

As shown in Table 3, the institutional tuition increases in states providing incentives for tuition control and connecting tuition policy to financial aid policy tend to be lower than that at institutions in states without such policies. The same pattern was observed in tuition changes by dollar and percentage. This implies that state policies of providing incentives to limit the tuition increase and of linking tuition policy and financial aid policy may be working. Unexpectedly, the average institutional tuition increase in states having tuition caps was $2,923 (or 96.9%), which is higher than increases at institutions in states without tuition caps ($2,539, or 79.9%). The causal relationships between these policy variables and tuition change are examined through the analysis of hierarchical multiple regressions.

Impacts of State Policies on Tuition Increases

The null hypothesis of "no effect of state tuition control policy or tuition-setting authority on tuition change" was tested at the alpha level .10, considering the modest sample size and the complexity of each state policy and

Table 4. Predicting Tuition Increase (Dollar).

Variables	*b*	β	*t*
Authority_Institution	539.47	.15	3.98***
Incentive	−145.83	−.06	−1.82*
Link_Tuition & Aid	−372.00	−.15	−4.44***
Caps_on_Tuition	466.54	.19	5.94***
Enrollment_Change	4.301	.13	4.11***
Tuition_Revenue % Change	5.05	.06	1.72*
State Appropriate_Revenue % Change	−19.71	−.18	−5.86***
Initial Tuition	.59	.58	16.73***

Note. Enrollment change was divided by 100. Adjusted R^2 = .551.
*p< .10. **p< .05. ***p< .01.

context. Table 4 shows that state policy on tuition setting and efforts to control tuition have a significant impact on tuition increases. Tuition-setting power designated to an individual institution is a significant positive predictor (b = 539.47, t = 3.98, p< .001). That is, institutions having the authority to set tuition tended to increase their tuition by $539.47 more than those institutions located in states where there are substantial controls on tuition-setting power, when other variables are held constant. Meanwhile, providing incentives and linking aid policy are negatively related to tuition increases (b = −145.83, t = −1.82; and b = −372.00, t = −4.44, respectively). In short, state efforts on tuition control such as providing incentives to minimize tuition increases and linking state tuition policy to financial aid policy are working in suppressing institutional tuition increases.

The standard beta coefficients suggest that the tuition amount in 1998 is the best predictor for the size of tuition increase. Institutions with higher tuition in 1998 would be more likely to raise their tuition in dollars and percentage. Interestingly, existence of a cap (cap/curb/freeze) affected tuition amount increase ($467) and tuition percentage increase (12%; see b = 466.54 in Table 4, b = 12.08 in Table 5). The coefficient of state appropriation proportion was negatively related to the tuition price outcomes, which is consistent with the patterns shown in Appendix C. The enrollment change is also positively related to tuition increase in dollars and percentage (Tables 4 and 5). In other words, as enrollment (demand) increased, tuition (price) also increased, just as market demand and price response interact.

Table 5 shows that the tuition increase is positively and significantly associated with institutional tuition-setting power (b = 16.10, t = 3.41) and with caps on tuition (b = 12.08, t = 4.42), holding constant other policy and control

Table 5. Predicting Tuition Increase (Percentage).

Variables	*b*	β	*t*
Authority_Institution	16.10	.17	3.41**
Incentive	−4.99	−.08	−1.80*
Link_Tuition & Aid	−7.82	−.12	−2.68**
Caps_on_Tuition	12.08	.18	4.42***
Enrollment_Change	.12	.13	3.35**
Tuition_Revenue % Change	.20	.10	1.99**
State Appropriate_Revenue % Change	−.62	−.21	−5.32***
Initial Tuition	−.01	−.30	−6.64***

Note. Enrollment change was divided by 100. Adjusted R^2 = .232.
*p< .10. **p< .05. ***p< .01.

variables; it is negatively related to providing incentives (b = −4.99, t = −1.80) and linking aid policy (b = −7.83, t = −2.69).

Research Question 2 asked about the relative effectiveness of tuition control policies. Notable are the strong positive effects of two policies, giving the tuition-setting power to individual institutions (dollar: β = .15; percentage: β = .16) and placing caps on the tuition increase (dollar: β = .19; percentage: β = .18). The beta coefficients suggest that providing incentives is less powerful than other tuition control policies.

The variance explained by the base model without the four tuition policy variables (initial tuition dollar, enrollment change over 10 years, change in tuition proportion in total revenue, and change in state appropriation proportion in total revenue) was 47% for the outcome of tuition increase in dollars and 16% for the outcome of tuition increase in percentage. Variance explained by the final model for tuition increase in dollars was 55.1%, while that of the model for tuition increase in percentage was 23.2%. We observed about a 7% to 8% increase in R^2 by state policy/efforts variables. No multi-collinearity was observed.

Discussion and Policy Implications

College tuition price has been an important public policy topic for decades. All 50 states in the United States have not only played key roles in the operations of public colleges and universities, but have also influenced students' tuition and financial aid for college attendance. State support for public higher education institutions has been dwindling due to decreasing revenue, but each state still has its own tuition control or management system. Using

data drawn from IPEDS and SHEEO reports, this study sought to provide important insights into state higher education policies, particularly examining tuition policy impact on tuition control or increase in public colleges and universities. This study briefly discussed which policy was more effective or ineffective, controlling for competing or supplemental tuition policies in the multiple regression models (of predicting tuition increase in dollars and percentage).

Findings from bivariate and multiple regression analysis were mostly consistent. The overall multiple regression model analysis suggests that selected tuition control policies influence tuition changes. The four policy variables added 7% to 8% of the total variance in two tuition models (increase in dollars and percentage). The same set of independent variables explained variance in tuition dollar increase better than change rate (in variance, 55.1% vs. 23.2%). The two tuition models have similar coefficient signs, adding to the internal validity in models.

The base model including only four control variables is consistent with the literature and with our initial understanding of the relationship with tuition increase or change outcome. If the tuition in 1997-1998 was high, the dollar amount of tuition change was also high. It is notable that institutions that are initially high in tuition dollars are the ones most likely to increase the dollar amount over 10 years, but they are not likely to increase very much by percentage. It is possible that those high-tuition institutions or their state authorities might have attempted to control tuition increase, at least by proportion. The standardized coefficient of initial tuition (in 1997-1998) was also largest in tuition regression models, suggesting that it is definitely a lasting contributing factor to tuition change. Not surprisingly, the increase in state appropriation proportion in core revenue was negatively associated with tuition amount and proportion increases. This negative relationship is consistent with the trend data of tuition and state appropriation (Appendix C). In addition, the data reveal that student enrollment change is significantly associated with tuition increase, and the positive effect cannot be ignored; it resembles how the market responds to increasing consumer demands (as in the Price and Demand model in economics). Heller (2001) also recognized the market interaction pattern between enrollment and tuition, noting that coexistence of rising prices and rising enrollments is not contradictory.

The selected policy effects were analyzed through regression models presented in Tables 4 and 5. In determining whether some policies are working, linking financial aid with tuition policies as well as providing incentives to suppress tuition increases were revealed to be effective, but a tuition cap (and/or curb/freeze) policy is rather counterproductive in tuition control. While findings regarding incentives and linkage to financial aid are intuitive,

those pertaining to cap policy are not. Tuition-setting power designated to individual public institutions seems to be a contributing factor for tuition increase. It is important to note that these effects are still noticeable despite adjusting for other state policy variables and institutional financial characteristics. The following discussion provides interpretations and implications regarding how each policy works, along with other policy contexts.

One of the current trends in higher education is increasing privatization, which is a process of shifting from state-dependent, low-tuition institutions to institutions dependent on tuition revenue and alternative revenue sources (Priest & St. John, 2006). Likewise, tuition-setting power tends to be moving from the state or state agencies to public institutions. This study, however, reveals that tuition is more likely to increase when the primary authority for tuition-setting decisions is located at the institutions, as opposed to other options. This is consistent with previous tuition studies (Calhoun & Kamerschen, 2010; Knott & Payne, 2001). In addition, this is one indication that "public" universities as agents might hold their own institutional goals apart from states' goals to provide more affordable college education and to accomplish their public mission. A state or state coordinating board wishing to control college tuition increase would be wise to retain the authority to set the tuition level or provide certain guidelines.

Linking tuition increase to financial aid policy appears to be working well in suppressing tuition increases. This linkage was a negative predictor or positive suppressor for tuition increase. It may be that linking the policies works as follows: When institutions have to increase financial aid as they increase tuition, the net income generated by tuition increase would be smaller and the increased sticker price would affect the recruitment of students because students have alternative choices for colleges. Moreover, the management and labor cost to coordinate tuition and aid increases might rise. This study did not intend to demonstrate how individual states are linking tuition and financial aid and how the combined policies are working; however, it can stimulate future studies to examine more "how" questions.

The states' efforts at providing incentives to limit tuition increase seem to be moderately effective. The nature of states' offers or incentives to institutions to suppress tuition increase is, however, somewhat unclear and vague. There are various types and degrees of incentives based on policies and the financial condition of individual states; these types and degrees of incentives would matter in measuring the effects. Perhaps institutions would be less inclined to raise tuition if there were either compensating incentives or coercive penalties.

The cap (or cap/curb/freeze) policy was most interesting. We would expect that institutions adopting tuition caps, curbs, and freeze policies might not

increase tuition as much as institutions without this policy. However, it was not the case; cap policy has a strong positive effect on tuition increase. The cap policy seems to be working against tuition control in public higher education institutions. In what follows, we attempt to make sense of this result through the concept of the principal and agent model and actual cap ranges among states.

Applying the principal and agent model, one can envision a scenario of the moral hazard occurring in a public university (agent) having a different organizational self-interest and pursuing private goals that differ from the goals of the state (principal). The governmental goal is to make college education more affordable for their residents, while institutions try to increase tuition and fees to generate necessary revenue to maintain or improve the quality of education. The introduction of a cap policy could be seen as a threat to institutions. Once public universities hear of a cap possibility to be mandated by state authorities, they might raise the tuition and fees preemptively. Moreover, because state governments usually do not have enough information about the relationship between the various cost and the quality of learning, it is hard for states to monitor or control the rising tuition and fees.

Among states with a tuition cap policy, each has a different range of caps. While Oregon caps tuition increase at no more than 3%, for instance, Idaho caps at 10%, New Jersey at 8%, and Minnesota at 7% (Boatman & L'Orange, 2006). Except for Oregon, these are much higher than rates of inflation or the higher education price index. Because tuition caps vary, the effect of establishing a tuition cap might often be limited or counterproductive. Once states set higher tuition caps, institutions may increase the tuition up to the limit. At any rate, this result implies that if states truly want to utilize tuition cap policy as a tuition control tool, the cap should not be set too high. Nevertheless, reasons for the impacts of selected policies should be investigated further in future studies.

Conclusion

Findings suggest the necessity of reexamining tuition-setting authority and statewide coordination of institutions if the public wants reasonable tuition control during the next decade. State policies of linking tuition to financial aid and providing incentives tend to be suppressing tuition increase, whereas the cap policy is most troublesome due to its unexpected positive effect on tuition increase. Despite all these state policies, tuition and fees at public higher education institutions have increased far beyond the inflation rate and family incomes. The tuition control issue is not simple, because it is related to states' appropriations for the enterprises of public institutions and state grant money given to students based on their needs or academic criteria,

depending on each state's priorities and political decisions. Moreover, states' control efforts may serve college students and their parents, but they could be a barrier to high-quality education and the many services public institutions provide. The ideal balance is more easily described than achieved. Tuition control policies and their effects should be understood in the context of states' efforts to meet the public's demand for college affordability, while allowing higher educational institutions the autonomy to achieve academic excellence.

Appendix A

Variable Coding and Description

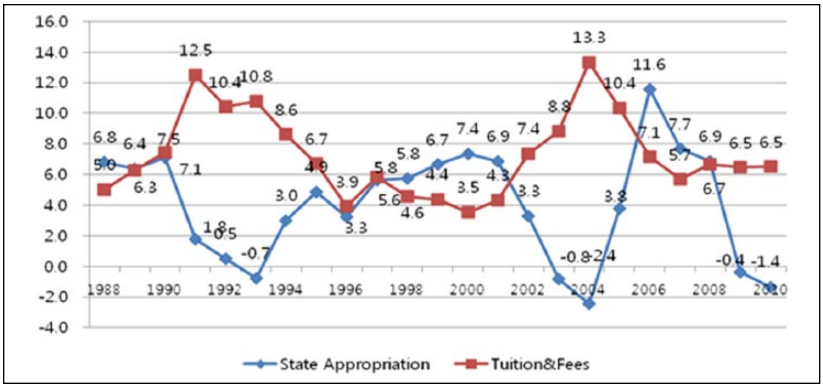
Variables	Coding and descriptions
Authority_Institution	Authority_Institution (yes): If individual institutions have the authority to set tuition, Authority Institution (yes) = 1, otherwise 0
Caps_on-Tuition	Caps (yes): If states have tuition caps, curbs, or freezes on tuition increases (if listed on either 2003 or 2006 report), Caps (yes) = 1, otherwise 0
Incentive	Incentive (yes): If states provide any incentive to minimize tuition increases (if listed on either 2003 or 2006 report), Incentive (yes) = 1, otherwise 0
Link_Tuition & Aid	Some states reported that their tuition policies are linked to financial aid policies Link_Aid (yes): If states require linking tuition change policy to financial aid policy (if listed on either 2003 or 2006 report), Link_Aid (yes) = 1, otherwise 0
Institution Type	Institutional type based on the Carnegie Classification 2005-Basic (doctoral = 1, master's = 2, and baccalaureate = 3: by degree-granting types)
Tuition_Change (dollar)	Change of tuition by dollar between academic year 1997-1998 and academic year 2006-2007
Tuition_Change (percentage)	Change of tuition by percentage between 1997-1998 and 2006-2007
Enrollment_Change	Change of FTE (Full-time equivalent) enrollment between 1997-1998 and 2006-2007 (undergraduate)
Tuition_Revenue % Change	Change of tuition and fees as a percentage of core revenues (percentage)
State Appropriation_Revenue % Change	Change of state appropriation as a percentage of core revenues (percentage)
Final Tuition (Tuition_in_2007)	In-state tuition and mandatory fees—First-time, full-time undergraduate 2006-2007
Initial Tuition (Tuition_in_1998)	In-state tuition and mandatory fees—First-time, full-time undergraduate 1997-1998

Appendix B

Tuition Control Policies

State name	Caps	Incentive	Link_Tuition & Aid
Alaska	Yes	No	Yes
Alabama	Yes	No	No
Arkansas	Yes	No	Yes
Arizona	Yes	Yes	Yes
California	Yes	Yes	Yes
Colorado	Yes	No	Yes
Connecticut	No	Yes	Yes
Delaware	Yes	No	No
Florida	No	Yes	Yes
Georgia	Yes	Yes	No
Hawaii	Yes	Yes	Yes
Iowa	No	No	Yes
Idaho	Yes	No	No
Illinois	No	No	No
Indiana	No	Yes	No
Kansas	Yes	No	No
Kentucky	Yes	Yes	No
Louisiana	Yes	Yes	Yes
Massachusetts	No	No	No
Maryland	No	No	No
Maine	Yes	No	No
Michigan	Yes	No	No
Minnesota	No	No	No
Missouri	Yes	No	No
Mississippi	No	No	No
Montana	Yes	Yes	No
North Carolina	Yes	No	Yes
North Dakota	Yes	Yes	No
Nebraska	Yes	No	No
New Hampshire	Yes	No	No
New Jersey	Yes	Yes	No
New Mexico	Yes	No	No
Nevada	Yes	Yes	No
New York	Yes	Yes	Yes
Ohio	Yes	No	Yes
Oklahoma	No	No	No
Oregon	Yes	No	No
Pennsylvania	Yes	Yes	No
Rhode Island	Yes	No	Yes
South Carolina	Yes	No	No
South Dakota	Yes	No	No
Tennessee	Yes	No	No
Texas	Yes	Yes	Yes
Utah	Yes	Yes	No
Virginia	No	Yes	Yes
Vermont	Yes	Yes	No
Washington	No	Yes	Yes
Wisconsin	No	Yes	No
West Virginia	Yes	No	No
Wyoming	Yes	No	No

Appendix C



Percentage of Change in 4-Year Public Institution Tuition and State Appropriation, 1988-2010.
Source. Integrated Postsecondary Education Data System.

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